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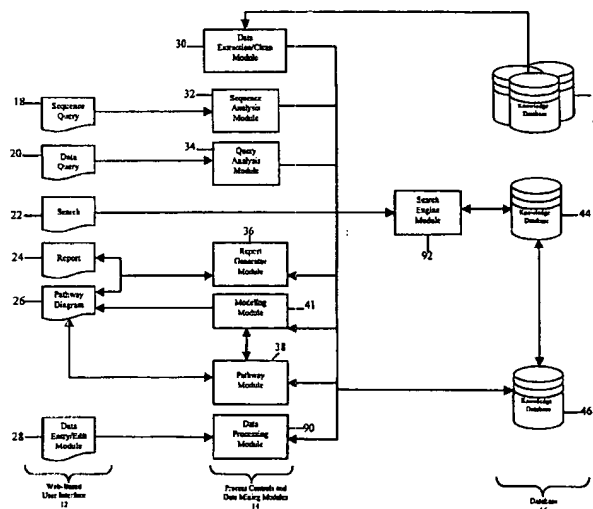
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**Declarations under Rule 4.17:**

- as to the identity of the inventor (Rule 4.17(i)) for all des-  
ignations
- as to applicant's entitlement to apply for and be granted a  
patent (Rule 4.17(ii)) for all designations

[Continued on next page]

(54) Title: **SYSTEM FOR MODELING BIOLOGICAL PATHWAYS**



(57) Abstract: A computerized system for modeling biological pathways is provided. The system comprises a database having a knowledge database for storing at least one attribute of at least one entity and a pathway database for storing at least one pathway diagram; a user interface for creating, querying, manipulating and viewing data from the database; a process system having a modeling module for simulating or analyzing the behavior of an attribute on a pathway diagram and a pathway editor module for retrieving, editing and saving at least one pathway diagram. The invention may be implemented on a web-based system that provides end users with the ability to create new pathway models, edit or manipulate existing pathway models, perform sequence searches and data queries, and generate reports.



- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations*

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

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# INTERNATIONAL SEARCH REPORT

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## A. CLASSIFICATION OF SUBJECT MATTER

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According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, BIOSIS, INSPEC

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>US 5 930 154 A (THALHAMMER-REYERO)  27 July 1999 (1999-07-27)  abstract  column 1, line 64 -column 2, line 60  column 3, line 31 -column 4, line 67  column 5, line 48 -column 8, line 4  column 9, line 17 -column 11, line 62  column 17, line 32 - line 60  column 18, line 40 -column 19, line 60  column 21, line 26 -column 22, line 14  column 27, line 21 -column 29, line 3  column 39, line 12 -column 42, line 7  figures 1,5,15-18  claims 1,4,27,30</p> <p style="text-align: center;">--- -/--</p>	1-23



Further documents are listed in the continuation of box C.



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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>GORYANIN I ET AL: "Mathematical simulation and analysis of cellular metabolism and regulation" BIOINFORMATICS, OXFORD UNIVERSITY PRESS, SURREY, GB, vol. 15, no. 9, September 1999 (1999-09), pages 749-758, XP002190906 ISSN: 1367-4803 cited in the application the whole document</p>	1-23
X	<p>HOFESTADT R ET AL: "Interactive modelling and simulation of biochemical networks" COMPUTERS IN BIOLOGY AND MEDICINE, MAY 1995, UK, vol. 25, no. 3, pages 321-334, XP002257054 ISSN: 0010-4825 abstract page 321, paragraph 1 -page 322, paragraph 3 page 323, last paragraph -page 324, paragraph 1 page 326, paragraph 5 - paragraph 8 page 329, paragraph 1 - paragraph 2 page 332, paragraph 1 -page 333, last paragraph figures 1-3</p>	1-23
X	<p>WO 00 65523 A (PHYSIOME SCIENCES INC) 2 November 2000 (2000-11-02) abstract page 4, line 6 -page 5, line 20 page 6, line 13 -page 7, line 31 page 9, line 5 -page 10, line 3 page 12, line 1 -page 13, line 22 page 14, line 27 -page 15, line 12 page 16, line 18 -page 17, line 21 page 18, line 24 -page 20, line 19 figures 1,3 claims 1,4</p>	1-23
X	<p>SALAMONSEN W ET AL: "BioJAKE: a tool for the creation, visualization and manipulation of metabolic pathways" PROCEEDINGS OF THE PACIFIC SYMPOSIUM ON BIOCOMPUTING, XX, XX, 4 January 1999 (1999-01-04), pages 392-400, XP002143430 abstract page 392, line 1 -page 393, line 4 page 393, line 18 -page 395, line 24 page 396, line 3 - line 27 page 397, line 11 -page 399, line 33 figure 1</p>	1

# INTERNATIONAL SEARCH REPORT

International Publication No  
PCT/US 01/26887

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>WO 00 49540 A (CELLOMICS INC ;QU LONG (US); WANG JIAN (US); HARRINGTON CHRISTOPHE) 24 August 2000 (2000-08-24) abstract  page 6, line 1 -page 7, line 18  page 11, line 1 - line 22  page 14, line 18 -page 15, line 18  page 16, line 19 -page 17, line 13  page 20, line 13 - line 18  page 35, line 7 -page 36, line 7  page 49, line 12 -page 50, line 4  figures 1-4  claim 1</p> <p style="text-align: center;">---</p>	1,3-5, 17,22,23
Y	<p>TOMITA M ET AL: "THE E-CELL PROJECT: TOWARDS INTEGRATIVE SIMULATION OF CELLULAR PROCESSES"  RECOMB 2000. PROCEEDINGS OF THE 4TH. ANNUAL INTERNATIONAL CONFERENCE ON COMPUTATIONAL MOLECULAR BIOLOGY. TOKYO, JAPAN, APRIL 8 - 11, 2000, PROCEEDINGS OF THE ANNUAL INTERNATIONAL CONFERENCE ON COMPUTATIONAL MOLECULAR BIOLOGY, NEW YORK, NY: ACM, US,  vol. CONF.4, 8 April 2000 (2000-04-08), pages 290-298, XP001049507  ISBN: 1-58113-186-0  page 290, right-hand column, paragraph 3  -page 291, left-hand column, paragraph 2  page 296, left-hand column, paragraph 2  -page 297, left-hand column, paragraph 1</p> <p style="text-align: center;">---</p>	1,3,5
Y	<p>ARITA M: "Metabolic reconstruction using shortest paths"  SIMULATION PRACTICE AND THEORY, vol. 8, no. 1-2, 2000, pages 109-125, XP002257055  abstract  page 109, paragraph 1 -page 111, paragraph 2  page 112, paragraph 2 -page 113, paragraph 2  page 117, paragraph 3 - paragraph 6  page 123, paragraph 2 - paragraph 7</p> <p style="text-align: center;">---</p> <p style="text-align: center;">-/--</p>	4

## INTERNATIONAL SEARCH REPORT

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lication No  
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	PROCEEDINGS IEEE INTERNATIONAL SYMPOSIUM ON BIO-INFORMATICS AND BIOMEDICAL ENGINEERING, ARLINGTON, VA, USA, 8-10, vol. CONF, 8 November 2000 (2000-11-08), pages 214-218, XP002257056 abstract page 214, right-hand column, paragraph 1 -page 215, left-hand column, paragraph 2 page 216, right-hand column, paragraph 1 -page 218, left-hand column, last paragraph	17, 22, 23
A	----- MENDES PEDRO ET AL: "Non-linear optimization of biochemical pathways: Applications to metabolic engineering and parameter estimation" BIOINFORMATICS (OXFORD), vol. 14, no. 10, 1998, pages 869-883, XP002257057 ISSN: 1367-4803 abstract page 869, left-hand column, paragraph 1 -page 870, left-hand column, paragraph 2 page 871, left-hand column, paragraph 1 -right-hand column, paragraph 1 page 875, left-hand column, paragraph 3 -right-hand column, paragraph 1 page 878, right-hand column, paragraph 2 -page 881, last paragraph -----	1-23

# INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5930154	A	27-07-1999	DE 69603020 D1	29-07-1999
			DE 69603020 T2	24-02-2000
			EP 0821817 A1	04-02-1998
			WO 9622575 A1	25-07-1996
WO 0065523	A	02-11-2000	AT 237844 T	15-05-2003
			AU 3226100 A	10-11-2000
			CA 2367463 A1	02-11-2000
			DE 60002189 D1	22-05-2003
			EP 1171841 A1	16-01-2002
			JP 2002543502 T	17-12-2002
			WO 0065523 A1	02-11-2000
WO 0049540	A	24-08-2000	AU 3002700 A	04-09-2000
			CA 2363020 A1	24-08-2000
			EP 1163614 A1	19-12-2001
			WO 0049540 A1	24-08-2000